Resolution #31
2002-2003
FACULTY SENATE

TO: Dr. Paul Yu, College President
FROM: The Faculty Senate Meeting on: May 5, 2003
RE: I. Formal Resolution (Act of Determination)
   II. Recommendation (Urging the Fitness of)
   III. Other, For Your Information (Notice, Request, Report, etc.)

SUBJ: Computational Science Graduate Curriculum Revisions

Signed: [Signature]
Date Sent: 6/2/03
(Dr. Kenneth O'Brien, 2002-2004 Faculty Senate President)

TO: The Faculty Senate
FROM: Dr. Paul Yu, College President
RE: I. Decision and Action Taken on Formal Resolution (circle)
   a. Accepted. Effective Date: 8/1/03
   b. Deferred for discussion with the Faculty Senate on __/__/____
   c. Unacceptable for the reasons contained in the attached explanation

II, III. Response to Recommendation or Other/FYI
   a. Received and acknowledged
   b. Comment:


DISTRIBUTION TO: President's Staff
                  Dean's Council

Distribution Date:
Signed: [Signature]
Date: 7/28/03
(Dr. Paul Yu, President, SUNY College at Brockport)

Faculty Senate, 06/25/03
C:\Documents and Settings\user\My Documents\Resolution Cover Sheets and Numbers\2002-2003-31.res.doc
FACULTY SENATE OFFICE
RESOLUTION PROPOSAL COVER PAGE
2002-2003 Academic Year

Submit all proposals to the Faculty Senate President electronically or on a disk with a hard copy.
Please provide cover page information requested.

1. PROPOSAL TITLE:
Please be somewhat descriptive, for example, Proposed Resolution on Graduate Probation/Dismissal rather than Graduate Proposal.
Proposal for Graduate Curriculum Revisions to the Computational Science Program

2. BRIEF DESCRIPTION OF PROPOSAL:
Proposed revisions to the curriculum for the Master’s degree in Computational Science. Revisions reduce the role of swing courses and reflect most current experience on appropriate curriculum content in the rapidly changing field of computational science.

3. SUBMISSION DATE:
February 28, 2003

4. SUBMITTED BY: (contact person)

<table>
<thead>
<tr>
<th>Name</th>
<th>Department</th>
<th>Phone</th>
<th>Email</th>
</tr>
</thead>
<tbody>
<tr>
<td>Robert E. Tuzun</td>
<td>Computational Science</td>
<td></td>
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</tr>
</tbody>
</table>

5. CHECK COMMITTEES TO COPY: (Senate office use)

<table>
<thead>
<tr>
<th>Committee</th>
<th>Copy To</th>
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</tr>
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<tbody>
<tr>
<td>_ Budget</td>
<td>_ Committee Chair</td>
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<td>_ College Environment</td>
<td>_ Entire Standing Committee</td>
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<td>_ Enrolment Policies</td>
<td>_ Others: Executive Committee</td>
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<td>_ Undergraduate Curriculum</td>
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6. REVISION DATES: (place these directly on the updated document)
Revisions are made by the originating department upon the recommendations of the standing committees and the Faculty Senate. Forward all revised editions for presentation to the Senate electronically to the Senate office secretary prior to Senate review and vote.
Proposal for Graduate Curriculum Revisions
Computational Science Program

Date: February 28, 2003

To: Faculty Senate Graduate Curriculum Committee

From: Robert E. Tuzun, Assistant Professor and graduate director, Department of Computational Science

Purpose: This document contains proposed revisions to the curriculum for the Master’s degree in Computational Science. These revisions (a) reduce the number of swing courses, which have been increasingly criticized and discouraged campus-wide, and (b) reflect our most current experience on appropriate curriculum content in the rapidly changing field of computational science. The swing course issue has become particularly troublesome and makes immediate curriculum change necessary.

Contents:
A. Overview
   a. Rationale
   b. Summary of changes
B. Proposed curriculum revisions for MS in Computational Science—side-by-side comparison with present curriculum
C. Sample timetables for present and revised curricula
D. Detailed justifications
E. Demand for new focus; clientele
F. Staffing and computing resources
G. Enclosures
   a. Commentary from Chair of Department of computational Science
   b. Commentary from Dean of Letters and Sciences
   c. Commentary from Academic Computing
   d. Commentary from Drake Library
   e. Letters of support from participating departments
A. Overview

a. Rationale

Over the past few years, students from several departments have complained about the level of presentation and rigor in swing courses. In response to these concerns and to outside feedback such as the most recent Middle States report, the administration has increasingly discouraged swing courses. In addition, many other schools do not have swing courses or have swing course structures different from ours; this can complicate the issue of transfer credit. Such issues can adversely affect student recruitment and create student dissatisfaction. To address these concerns, we propose to eliminate two swing courses from the requirements while simultaneously increasing the required number of credits at or above the 600 level.

Since our last major curriculum change in 1999, we have introduced several new courses, updated others, and had the chance to observe current nationwide trends in computational science education. Based on this experience, we are proposing to replace our project paper and seminar requirement with a traditional thesis and defense, and to make one additional change in our core curriculum.

The changes sought are immediately necessary. The revised curriculum addresses serious issues with swing courses that have emerged since the last curriculum change. In addition, it is more rigorous than the existing program, and more in line with current computational workplace needs.

b. Summary of changes

1. Elimination of swing courses MTH581 and CSC506 from our requirements.
3. Addition of CPS604 to the core curriculum.
4. Reduction of the total credit requirement from 35 to 30, but increase in the required number of credits at or above the 600 level from 15 to 21.
### B. Proposed curriculum revisions

<table>
<thead>
<tr>
<th>Current curriculum</th>
<th>Revised curriculum</th>
</tr>
</thead>
<tbody>
<tr>
<td>23 credits of required courses and 12 credits of electives (500 level or above)</td>
<td>18 credits of required courses and 12 credits of electives, with at least 6 credits at or above the 600 level</td>
</tr>
</tbody>
</table>

**Required:**

- **Computer Science**—4 credit hours
- **CSC 506 Algorithms and Data Structures**

**Required:**

- **Mathematics**—3 credit hours
- **MTH 581 Discrete Mathematics II**

**Required:**

- **Computational science**—16 credit hours
  - CPS 533 Scientific Visualization (3)
  - CPS 602 Advanced Comp Software Tools (3)
  - CPS 644 Supercomputing and Applications (3)
  - CPS 698 Graduate Seminar (1)
  - CPS 699 Independent Study (3)
  - CPS 700 Project Paper (3)

**Required:**

- **Computational science**—18 credit hours
  - CPS 533 Scientific Visualization (3)
  - CPS 602 Advanced Comp Software Tools (3)
  - CPS 604 Computational Methods in the Physical Sciences (3)
  - CPS 644 Supercomputing and Applications (3)
  - CPS 699 Independent Study (3)
  - CPS 710 Thesis (3)

**Recommended electives (12 credits at a level):**

Courses other than those listed below be taken, but consent of the graduate advisor is required.

**Computational Science**
- CPS 504 Applied and Computational Math (3)
- CPS 604 Computational Methods in the Physical Sciences (3)
- CPS 632 Deterministic Dynamical Systems (3)
- CPS 633 Stochastic Dynamical Systems (3)

**Computer Science**
- CSC 511 Computer Architecture (3)
- CSC 512 Operating Systems (3)
- CSC 519 Computer Networks (3)
- CSC 522 Relational Database Design (3)
- CSC 529 Object-oriented Programming (3)
- CSC 601 Theory of Programming Languages (3)
- CSC 611 Advanced Computer Architecture (3)

**Mathematics**
- MTH562 Math Models for Decision Making II (3)
- MTH571 Numerical Analysis (3)
- MTH621 Algebra (3)
- MTH641 Mathematical Statistics (3)

**Mathematics**
- MTH562 Math Models for Decision Making II (3)
- MTH571 Numerical Analysis (3)
- MTH581 Discrete Mathematics II (3)
- MTH621 Algebra (3)
- MTH641 Mathematical Statistics (3)

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Note: under the revised curriculum, students who had previously taken CPS433 at Brockport, or its equivalent at another school, would be required to take 3 credits at or above the 600 level in its place, with advisor approval.
C. Sample timetables for current and revised curricula

Entering students have widely varying levels of mathematical and programming skills. The plans of study shown below assume previous coursework in the appropriate prerequisites. Because our program has historically included both full- and part-time students, sample full- and part-time timetables are shown for the present curriculum and, on the next page, revised curriculum.

Sample timetables for MS in Computational Science (present curriculum)

### FULL TIME

<table>
<thead>
<tr>
<th>Fall, Year I</th>
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<tbody>
<tr>
<td>CSC506</td>
<td>MTH542 Statistical Methods II (3)</td>
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<tr>
<td>Algorithms and Data Structures (4)</td>
<td>CPS533 Scientific Visualization (3)</td>
</tr>
<tr>
<td>MTH581 Discrete Mathematics II (3)</td>
<td>CPS602 Advanced Comp Software Tools (3)</td>
</tr>
<tr>
<td>CPS504</td>
<td>CPS604 Computational Methods in the Physical Sciences (3)</td>
</tr>
<tr>
<td>Applied and Computational Math (3)</td>
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<tr>
<td>CPS644</td>
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<tr>
<td>Supercomputing and Applications (3)</td>
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<tr>
<td>CPS632</td>
<td>MTH542 Statistical Methods II (3)</td>
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<td>Deterministic Dynamical Systems (3)</td>
<td>CPS533 Scientific Visualization (3)</td>
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<td>CPS698</td>
<td>CPS602 Advanced Comp Software Tools (3)</td>
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<td>Graduate Seminar (1)</td>
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<tr>
<td>CPS699</td>
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<tr>
<td>Independent Study (3)</td>
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<td>CPS700</td>
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<td>Project Paper (3)</td>
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### PART TIME

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<td>Applied and Computational Math (3)</td>
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<tr>
<td>MTH581 Discrete Mathematics II (3)</td>
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<td>CPS504 Applied Computational Math</td>
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<td>CPS632 Deterministic</td>
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<tr>
<td>CPS710 Thesis (3)</td>
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D. Detailed Justifications

Elimination of swing courses MTH581 and CSC506 from required curriculum
Our MS program currently requires swing courses CSC506—Advanced Data Structures and MTH581—Discrete Mathematics II. We propose to eliminate these as required courses on the following grounds, in addition to the general objections against swing courses:

- MTH581 is included only because it is a prerequisite to CSC506. Comparatively little of the CSC506 material is used in the department's core curriculum. These courses can be taken as electives if they are in line with the student’s particular interests.
- Many schools have swing course structures different from ours (or no swing courses at all). This can create ambiguity and complicate the issue of transfer credit. In the worst cases, this could lead to student dissatisfaction and perhaps even decide prospective MS degree students against our program.

Replacement of Graduate Seminar and Project Paper with traditional thesis and defense
Our current MS program requires written and oral presentations in CPS698—Graduate Seminar and CPS700—Project Paper. The Project Paper can cover internships, independent research, and so on; since the possible scope of the Project Paper is wide, some students are initially uncertain of what is expected of them. To make the requirements more understandable to students and to prospective employers, we propose to replace the Project Paper and Graduate Seminar with a traditional thesis and defense, combined into a new course: CPS710—Thesis. A thesis requirement would also make it easier to ensure a level of written and oral communications skills we would like to see in our graduates. This change will entail eliminating CPS698 and CPS700 when the last of the students under the current requirements have finished, and creating the following new course:

CPS710 Thesis. Mentored individual investigation for a substantial research project in computational science, to culminate in a master’s thesis and oral defense. 3 Cr.

Addition of CPS604 to core curriculum
The numerical solution of differential equations is an almost universal feature of computational research. Graduate programs in computational science, or computational tracks within graduate programs in the physical sciences, typically require extensive coursework in this area. In order to bring our own program’s coverage more in line with (a) that of other graduate computational science programs and (b) skill sets expected in today’s computational workplace settings, we propose to add CPS604—Computational Methods in the Physical Sciences—to the core curriculum.

Changes in credit requirements: total credits and number of credits at or above the 600 level
The present graduate Computational Science program requires 10 credits of swing courses. Over the past two years, swing courses have fallen into serious disfavor both college-wide and externally. The current college requirement for number or credits at or above the 600 level in a graduate program is 15. In view of the concerns about swing courses, it seems advisable to adhere to a stricter standard (21 credits) and to reduce the number of required swing level credits to 3 (CPS533—Scientific Visualization).

All of these proposed changes would change the total credit requirement from 35 to 30, but increase the required number of credits at or above the 600 level from 15 to 21. We would expect many students to take more than the minimum required number of credits. Computational science is multi-disciplinary (requiring skills in mathematics, programming, and application sciences), and incoming students are invariably stronger in some areas than others. In order to pursue their particular interests, many students will elect to take supplementary courses in excess of the MS program requirements.
E. Demand for new focus; clientele

There are two major rationales for this curriculum revision: the presence of swing courses, which have emerged as a serious issue both inside and outside the college, and the following of best practices in computational science education. These issues are discussed in the previous parts of this document and in the letters of support/commentary.

The current and revised curricula are aimed at the same clientele: students who wish to gain master's level mastery of computational skills and who want to be reasonably able to graduate within two years.

F. Staffing and computing resources

Within the Computational Science department, the revised curriculum essentially contains a course trade (Graduate Seminar and Project Paper to be replaced by Thesis). No new resources will be required.
Subject: Revised MS in CPS

Date: Tue, 01 Apr 2003 09:52:02 -0500

From: Michael Maggiotto <mmaggiot@brockport.edu>
To: "Yasar, Osman" <oyasar@brockport.edu>
CC: rtuzun@brockport.edu, "Appelle, Stuart" <SAppelle@brockport.edu>, "Stites-Doe, Susan" <sstites@brockport.edu>

Osman:

I am writing you as chair of the Faculty Senate Graduate Committee. I have reviewed the new curriculum proposed by Computational Sciences and sent to me by Bob Tuzun. I support it and urge the Senate to act favorably on it at the Senate's earliest opportunity.

Mike

Michael A. Maggiotto, Ph.D.
Dean, School of Letters & Sciences
SUNY Brockport
350 New Campus Drive
Brockport, NY 14420-2914

Phone: (585) 395-2394
Fax: (585) 395-2172
E-mail: mmaggiot@brockport.edu
February 4, 2003

Dr. Osman Yasar  
Chair, Computational Science

Dear Dr. Yasar:

This letter is sent regarding the proposed Revisions to the Computational Science Program.

There is no direct impact on computing resources expected. It is anticipated that current technology resources will be sufficient to meet program needs as long as software, equipment and campus network access is maintained and upgraded on an on-going basis. Information Technology Support Services supports the Graduate Curriculum Revisions to the Computational Science Program.

Sincerely,

[Signature]

Mary Jo Orzech, Ph.D.  
Director, Information Technology Support Services
To: Robert E. Tuzun, Assistant Professor, Computational Science
From: Frank M. Wojcik, Director of Library Services
Date: February 28, 2003
Re: Library Support for the Master's Degree in Computational Science

Drake Memorial Library currently has adequate resources in place to support the Master's degree in Computational Science, including that program's proposed revisions. We expect that as the program evolves its teaching faculty will discuss any changes in their information resources needs with the staff of Drake Memorial Library. The Library staff is committed to working with the faculty to continue providing appropriate information resources in support of the program.
Bob,
I shared the proposed revision of the CPS Graduate Program with our faculty. The changes were discussed at one of the departmental meetings this semester. Our department recognizes your desire to develop a program that will best serve the needs of your students. We are not in opposition to these changes and wish your program and students every success.
Charles Sommer
Subject: Curriculum Revision

Date: Thu, 13 Feb 2003 15:38:32 -0500
From: "Kadathur B. Lakshmanan" <KLakshma@brockport.edu>
Organization: State University of New York College at Brockport
To: RTuzun@brockport.edu

Bob

The Department of Computer Science considered your proposal for the revision of graduate curriculum on Tuesday February 11, 2003.

The Department has no objections to your curriculum revision.

-----

(A few comments on original proposal with minor proposed changes).
Kenneth P. O'Brien  
President, Faculty Senate  
SUNY College at Brockport

April 7, 2003

Dear Ken,

This letter is in support of Dr. Tuzun’s proposal for revisions in our MS curriculum in Computational Science (CPS). The revisions presented here mainly focus on rigor in swing courses. It increases the number of 600-level credits from 15 to 21. The revisions place a new Thesis requirement and an addition of a new 600-level course as a requirement for students in all tracks. CPS master’s program allows students to take 12 credits in an Application area (X) to allow a sub-specialization in Computational-X. Since this program is open to students with backgrounds in many fields, every student needs a different set of coursework to come to speed to gain a balanced combined education in mathematics, computer science, and sciences. Often times, students have to take some undergraduate prerequisites, which lengthens the duration of their master’s study.

The 30-credit program proposed by Dr. Tuzun has received departmental support as well as endorsement of the Faculty Senate Graduate Committee, the Dean of the School of Letters and Sciences, and that of the Dean of Graduate Studies.

If you have questions, please feel free to contact me, or Dr Tuzun at 395-2021.

Sincerely,

Osman Yasar  
Professor and Chair, Computational Science

State University of New York • College at Brockport • 350 New Campus Drive • Brockport, New York 14420-2963  
(585) 395-2021 • FAX (585) 395-5020 • www.cps.brockport.edu